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COMMERCIAL FORCING OF LILIES-OF-THE-VALLEY

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INTRODUCTION

The responsibilities falling on the man who forces lilies-of-the-valley are many. Competition is rather keen despite the fact that comparatively few are in the business. The hazards are numerous, and there is more money involved per square foot of bench space than with almost any other greenhouse crop. An inexperienced retail florist had better buy his cut lilies-of-the-valley, when he has orders necessitating their use, rather than to attempt to force them himself.

However, there is pleasure to be had in watching the crop grow. It seems almost unbelievable that in approximately three weeks the grower is rewarded with so valuable a crop in marketable condition. Many retail florists accustomed to selling high-quality stock can often turn spare time and space into profit by forcing a limited supply for special occasions.

This circular is based on a study of the forcing of lilies-of-the-valley for commercial purposes. It deals mainly with the details of handling after the planting stock is in the hands of the grower, the most desirable environmental conditions during forcing, the customary methods of harvesting, and the several phases of marketing with their specific problems.

BOTANICAL CLASSIFICATION AND CHARACTERS

Lilies-of-the-valley are classified as follows: Order, Liliaceae; genus, Convallaria; species, majalis. The variety *C. majalis alba* is the only one of importance. *C. majalis rosea* and a double-flowered variety are not valuable commercially.

Convallaria majalis alba, the lily-of-the-valley of commerce, is the common garden sort which bears small white, very fragrant, bell-shaped flowers in a radical raceme. The flower stalks are from 6 to 12 inches in length, one being produced in each pip under normal conditions. The leaves are entire and are formed above the crown or pip, which develops at the tip of an underground stem or rhizome. The flower forms, as in most bulbs, during the growth of the pip. A colored sheath or bud scale envelops the pip and subsequently the base of the leafstalk when growth occurs. (Figs. 1, 2, and 3.)

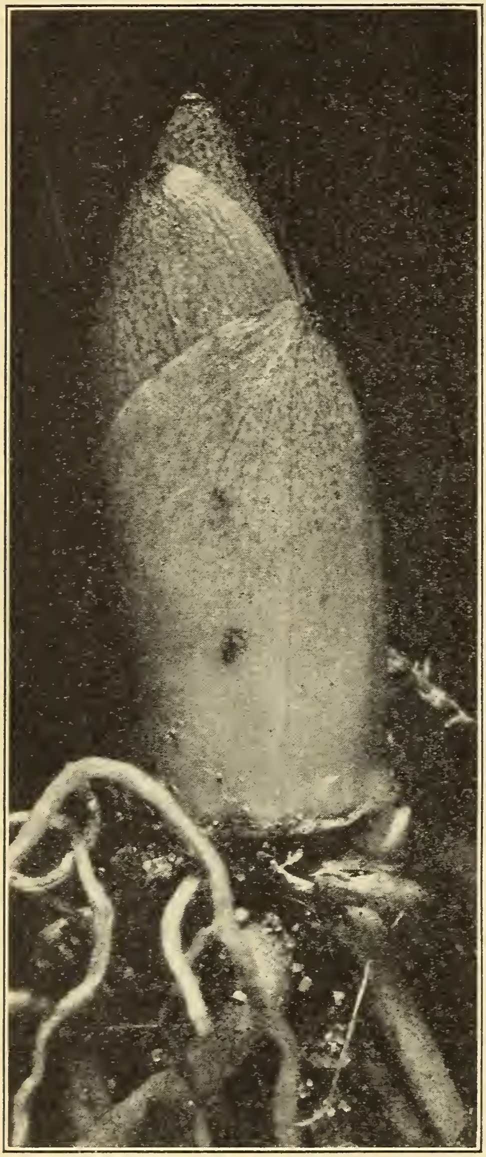
FIGURE 1.—Pip showing sheath structure of the lily-of-the-valley. × 6

Lilies-of-the-valley are widely disseminated. Their natural habitat, however, is in the mountains of Virginia and the Carolinas and in many mountainous regions of Europe and Asia. Probably greater quantities in natural environment are to be found in the province of Hanover, State of Prussia, Germany, than anywhere else.

PLANTING STOCKS

SOURCES OF SUPPLY

Many millions of stocks for planting, or "pips," as they are known to the trade, are annually grown in Germany, the Netherlands, and France, Germany being probably the largest producer, with Berlin and Hamburg as the chief centers of the lily-of-the-valley industry. The pips are exported to England and the United States chiefly, since first-class pips are not grown here or in England in sufficient numbers to satisfy the demand. The pips grown in Germany usually give good results in forcing. The crops from the Netherlands and France are utilized mainly in outdoor plantings.

In Germany the pips are grown by farmers who utilize the remote corners of apple orchards and other suitable locations in order to increase the family income. Each year the pips are dug and sold to a central packing concern, which packs them for export. There are, of course, some few growers who make more of a business of growing, but the main portion of the crop is supplied by small growers.

Localities may eventually be found in this country that will prove sufficiently promising in regard to weather conditions and soil to produce pips of adequate forcing adaptability, so that in the future most of the demand here may be satisfied from domestic sources.

METHODS OF PURCHASING

There are a number of methods by which the planting stock may be obtained. The large grower may go to Germany each year and personally pick out the year's supply. The desired quantities of the kinds or types of pips needed can be purchased after limited supervision of the grading and packing to insure getting only first-quality pips. Complete notes as to locality in which grown, lot numbers, etc., are useful information in the forcing of the pips and in the selection of the supply for the following year. The best time for buying is between October 15 and December 1, as the majority of pips are exported in November.

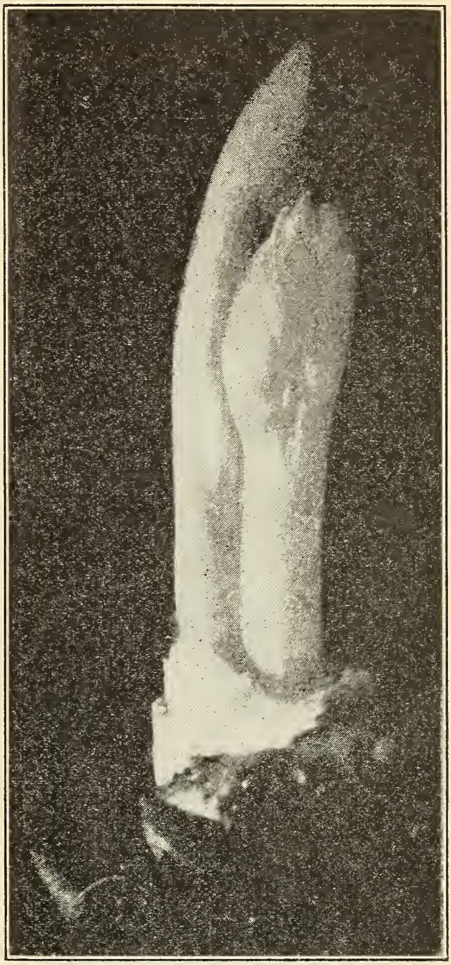

FIGURE 2.—Lily-of-the-valley pip with sheath leaves removed, showing leaf and flower stalks in miniature. × 6

Planting stock may also be purchased outright in this country at the dock, the grower paying cash to the importer for the entire lot. The grower desiring to purchase his stock in this way can inspect the cases at the dock and then have them sent to a warehouse, where they are insured after being inspected jointly by the purchaser and the proper warehouse official. The regular insurance contract calls for the pips to be held at a certain temperature, and if this is not done and damage results, the warehouse company is responsible. By this method of purchasing, the grower has control over the quality to a large extent and also can be certain of getting the proper type of pip at a season when it should be used.

A florist of limited capital must depend on the importer who stores a large quantity and collects cash only as the shipments are made. The latter offers lily-of-the-valley pips in cases of 2,500, 1,500, 1,000, 500, and 250. Commercial growers as a rule handle only the 2,500 cases, although there are times in the summer when cases of 1,000 are convenient. The importer is glad to reserve any quantity of pips for the grower and to ship according to instructions. In buying from an importer there is the satisfaction that if the pips are not as represented they may be returned and the reserve supply canceled.

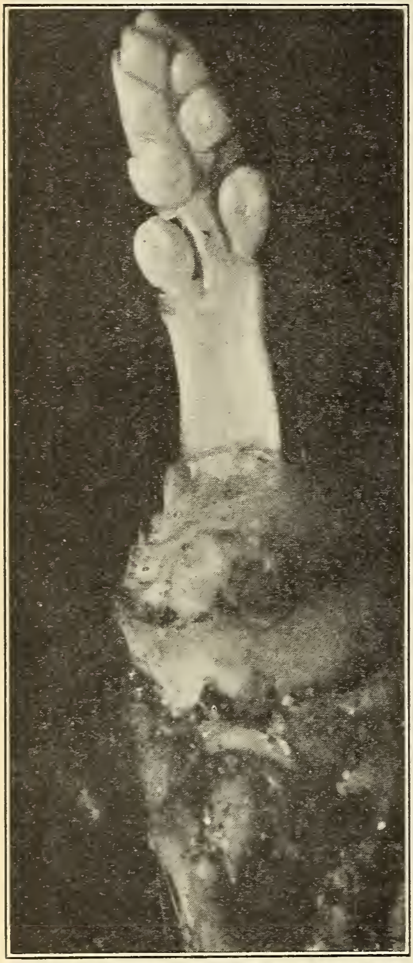

FIGURE 3.—Pip of lily-of-the-valley showing flower stalks and bells in detail. × 6

Seed houses keep a medium-quality pip and charge a much higher price than the importer because of holding and shipping in small lots and as a rule in small cases only. They sell chiefly to the small retail grower and to private growers.

KINDS OR TYPES

There are two principal types of pips with which the grower must become familiar — those used for early forcing and those used for late forcing.

The early-forcing pips arriving in October or November are commonly called "new-crop pips," to distinguish them from the pips received the previous fall that are still being used for forcing. These pips are kept in storage the minimum time required for satisfactory results and are used for forcing from January until May. They are strong and heavy with an abundance of fibrous roots and are grown in a light sandy soil. Early-forcing pips mature earlier and after at least two months' rest can be brought into flower with a small percentage of loss. The Württemberg pip, with its stiff, wiry stems and bells one-half inch in diameter, is an excellent example of this type. The new-crop pips that are forced during January and

February make little foliage, but as the storage period is lengthened before forcing, more foliage is produced, until in March very satisfactory leaf growth results.

Late-forcing pips (fig. 4) arrive in the United States along with or shortly after the early-forcing pips, both being termed "new crop" pips. It should be borne in mind that neither of these is suitable for forcing until after a storage period of at least two months. At the time of the arrival of the new crop, late-forcing stock of the previous year's importation ("old crop" pips that have been in cold storage) is being used, and this stock will be used until the time when the new-crop early-forcing pips will give satisfaction, viz., January. Then, after the supply of new-crop early-forcing pips is depleted, viz., in May, the new-crop late-forcing pips are forced, and these alone are used until the following January. These late-forcing pips are used to furnish foliage to some extent during January and February, along with the next year's early-forcing pips. Grown in a heavy clay soil, and possibly in a field with a northern exposure, the late-forcing pips mature later and are imported until Christmas. Often they are smaller, thinner, and more elongated as regards the crown bud than are the early-forcing pips. The sheath usually has a reddish-brown cast as compared with the purple color of the sheath of early-forcing pips. The rhizome is long, plump, and contains much food for long storage before forcing. Fibrous roots are often not so plentiful as in the early-forcing type. A good example of the late-forcing pip is the Vierlanden. (Fig. 5.) It is a strong grower and usually produces from 10 to 15 globose bells per flower stalk.

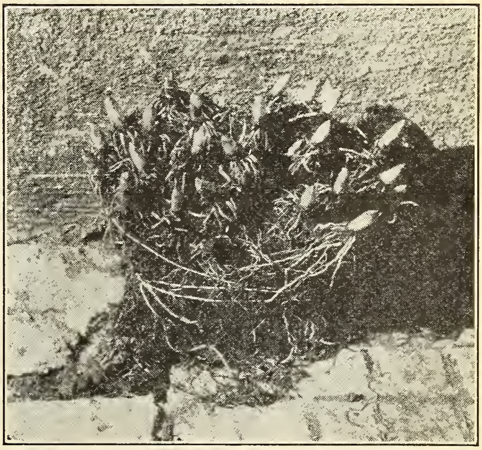

FIGURE 4.—Bunch of 25 late-forcing pips of lily-of-the-valley

GRADES TO BE AVOIDED

The quality of the planting stock is very important, as the most expert grower or forcer can not get good flowers from a poor grade of pips. Years of experience are usually required before a grower can acquaint himself with the various characteristics essential to the attainment of real success. Many grades and sizes of pips are offered for sale, and the stock on the market has been through varying conditions of growth, handling, transportation, and storage. A few grades of pips falling below the desired standards are described in the following paragraphs.

When the rhizomes are dug in the fall four sizes or ages are found. The smallest size is not considered of any age, as it is not much larger than a bud and has been just recently formed. The next size is said to be 1 year old, the following size larger 2 years old, and the largest size 3 years old. The 3-year-old group is divided into flowering pips and those that will not flower until grown another season. Most of the 3-year-old pips will flower, but they must be graded to reduce the loss in forcing.

Pips of the 1 and 2 year old classes at their best will make but few flower stalks. They usually produce leaf growth only. Naturally, this may add considerably to the loss that normally results from bud injury, the severing of rhizomes, or any other cause affecting the formation of perfect flowers. Any lot of pips to be considered first class should not contain more than 15 per cent of imperfect buds. If the age can not be otherwise told, 50 or 100 buds may be dissected. In this way an approximate average of blooming expectancy may be estimated.

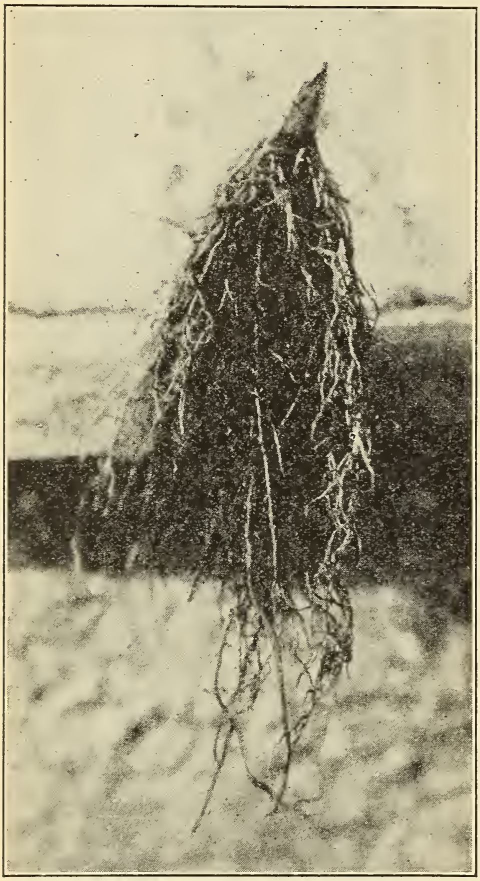

FIGURE 5.—A single late-forcing lily-of-the-valley

Besides the pips of the 1 and 2 year old classes, shriveled pips should be avoided if there is any indication that they have been overheated before drying out. This shriveled condition should not be confused with the natural shrinkage due to long storage.

Moldy pips should also be avoided. This condition is observed among the roots and is caused by insufficient washing or overheating, or a combination of both.

The terms "pushed" and "started" are applied to pips that previous to planting have begun their growth. Too high a temperature, either in the refrigerated holds aboard ship, on the dock, in the warehouse, or in transit to the grower, is responsible. Wherever this condition occurs the flowering of the pips will be affected. If the pips were dormant and in good condition when leaving the warehouse, "pushing" in transit will be less likely to affect seriously the quality of flowers. "Pushed" pips are fairly easy to recognize, as the sheath is usually parted on one side of the bud, and the tip is more pointed than is that of a dormant pip.

Repacking may be done by the importer if he finds that the bundles around the outer edges of the box contain pushed pips; or, in the case of moldy pips, he may repack after discarding the moldy bundles. An unscrupulous importer may mix the poor pips of small size with those of high quality, thereby working off at a good price the poor ones for which he paid very little and which could not be sold otherwise.

Buyers should also beware of diseased stock. Nematodes cause a disease usually characterized by the formation of excrescences or galls on the roots. Although the planting medium is used over and over indefinitely in the benches, there is not much danger from this disease because each crop occupies the space for such a short time. However, it is not at all wise to use nematode-infested stock.

EQUIPMENT

GREENHOUSES SUITABLE FOR FORCING

It makes little difference whether the greenhouse is of steel frame, iron, semi-iron, or wood construction in forcing the lily-of-the-valley. Even a sash house will serve the purpose. Neither does it matter much whether the house runs east and west or north and south. However, if convenient, it is advisable to have the house run a few degrees south of west, so that it will be adaptable to other crops that might be grown.

HEATING SYSTEM

Steam and hot-water heating systems will give equal results so far as the crop is concerned, provided more attention is given in the case of steam. Where only one or two greenhouses are in operation hot water is the ideal system, as in a mild climate no night firing is necessary and in moderate weather there is a great saving of coal.

The type of boiler used will depend on the number of houses to be supplied. It is well to have ample reserve capacity in the boiler so that forcing will be unnecessary and that additional houses may be heated without the installation of another boiler. The chief advantage of the sectional boiler is that by adding more sections the capacity can be increased. Other types may be equally efficient; in fact, more efficient in the case of tubular boilers for large ranges. Where space is very valuable the vertical boiler is more desirable than the horizontal type.

As heat is one of the limiting factors in the forcing of the lily-of-the-valley, it is essential that careful consideration be given the arrangement of the pipes. If a steam-heating system is installed, at least three 1¼-inch pipes should be placed under each bench; if hot water, three 2-inch pipes. More pipes may be used, but the extra ones should be fitted with control valves. Other pipes should be run along the outside walls to bring the temperature up to the crop requirement.

BENCHES AND BINS

For best results benches should be constructed of some durable wood such as cypress or redwood, and the outside one should be at least 6 inches from the side walls. If the walls are of concrete and the benches are built against them, the pips near the walls and for one-quarter of the distance across the bench will flower later than the rest, owing to the lower temperature. The same is true of a wooden wall, especially when cold weather prevails, because no warm air can travel between the bench and the wall, and in this case both will soon rot. Supports for the benches may be of wood or galvanized-iron pipe, the latter being more expensive but more durable.

To furnish shade enough to draw up the flower stems, it is necessary to construct bins or compartments over the benches. (Fig. 6.) Light wooden or pipe frames, on which black cloth is stretched, will serve very well as a top cover. The bins may be from 5 to 9 feet long with a partition of a material such as wood or cloth at each end. The frames should fit closely against these partitions. The top frame should be at least 18 inches above the top of the bench. Removable or hinged sides of wood may be used next to the paths. It is important to have everything, including the top frame, light proof.

There are several ways of retaining heat at the bottom of the bench. Burlap may be hung from the bench to the ground; the sideboards of the bench may extend 4 or 5 inches lower than the bench bottom; the entire bench may be boarded in from the bench side to the floor and small doors made 6 feet apart that can be opened or shut at will. Each bin should be so built as to operate separately, which will necessitate partitions under the bench also.

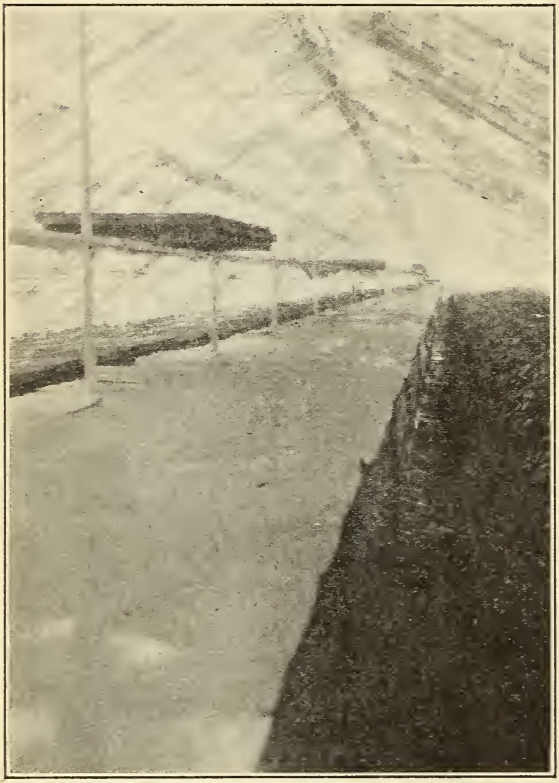

FIGURE 6.—Two benches of lilies-of-the-valley under bins

PLANTING

TIMING THE CROP

In timing the crop for special holidays such as Easter and Christmas, the season has much to do with the planting date. For Christmas forcing a full 21-day period should be allowed between the planting and the cutting dates. Cutting would probably begin about December 20. The cold weather at this season may be depended upon for holding back the crop, if necessary.

If Easter comes early, 20 days should be allowed, but if later, 19 days will be sufficient. If too much time is given for development of the crop and warm weather occurs, it may be difficult to retard growth. The new-crop pips are usually at their best for Easter because it is within a few weeks of their natural blooming season. If Easter comes very late, however, care should be taken not to plant too heavily, as outdoor lilies-of-the-valley may be on the market and lessen the sale of the forced flowers.

FLATS, PANS, AND BENCHES

In forcing lily-of-the-valley pips ground beds of course are not to be considered, because it is hard to provide for bottom heat satisfactorily. Poor drainage and inconvenience are additional drawbacks.

For forcing small quantities of lilies-of-the-valley for Easter, growers in general plant in flats, place the flats under the benches, and bring them out later to color the foliage. Unless the grower is particularly careful and attentive, this plan will produce bent flower stems by the time the flats are moved to stronger light. Usually the stems will be only partly straightened when the flowers are ready to be cut.

Lilies-of-the-valley planted in 6, 7, or 8 inch bulb pans make an attractive and appropriate gift at Easter. In this method the roots are often clipped off, so that 15 or 20 pips can be put into one pan. To obtain pans of first-class lilies-of-the-valley the best plan is to transplant from the bench pips that are going to produce good flowers. This can be done after the pips have had about 10 days' growth. Transplanting later than this is not recommended.

For commercial use 6-inch benches are the most convenient, and good crops may be had by their use. Their construction has been previously discussed. If bench space is scarce, close planting of the pips with only a small, thin wall of sand between may be practiced. If more room is available, planting across the bench in rows from 2 to 3 inches apart allows more ventilation and facilitates cutting flowers out when ready for market.

Assuming that the bench is empty, place crocks over the drainage holes and laths lengthwise of the cracks. Then put on about one-half inch of ashes. Fill the standard 6-inch bench three-quarters full of pure sand, and it is ready to plant.

After removing the roots of a crop that has been cut, the bulk of the sand is piled to one side and cleaned out down to the ashes only as planting of a new crop progresses. It may be necessary to add more sand to replace that lost on the roots of the previous crop.

PLANTING MEDIUMS

Sphagnum moss, sawdust, peat, leaf mold, or sand may be used as planting mediums, the latter being the cleanest, cheapest, and most extensively used. Pure sand, free from salt, is the best; any clay content tends to cause packing, thereby lessening drainage and soil atmosphere. The other materials do not settle sufficiently around the roots.

STORAGE OF PIPS

If no delay has occurred in transit from the warehouse to the grower, the pips should still be in a frozen condition when received, and if desired they may be placed in a local cold-storage plant for future use. A temperature range of 25° to 28° F. is recommended, the former being the minimum allowance for maintaining the embryonic flowers in a living condition, and the latter temperature the maximum in retarding all growth. If they are not frozen, do not attempt to hold them in cold storage, as an additional day's growth would result before the contents of the case would reach the required temperature, and any checking of "started" pips will materially lessen the quality of the crop obtained.

PREPARATION OF PIPS FOR PLANTING

The pips arrive from the cold-storage warehouse packed in sphagnum moss and usually are still frozen. If the pips are frozen and are to be planted the same day as received they must first be thawed out thoroughly. To do this, cold water should be run on the entire case before attempting to remove any of the bundles. If the bundles are forcibly removed, it is very probable that many frozen buds will be broken. When the bundles can be separated without snapping off the buds, they may be removed and put in a tub or in buckets of cold water to complete the thawing process. After they are thoroughly thawed out, the strings or willow ties are cut, the pips are placed on a small tray or box lid and planted at once.

THE CLOSE SYSTEM

The close system of planting consists of placing the pips in the bench without spacing them. When planting is completed, the surface of the sand appears very irregularly but closely spotted with pips, each individual having only a thin wall between itself and the adjacent pips.

Assuming the planter to be facing the bench with the bench end at his left and the entire length of empty bench at his right, a layer of sand about 1-inch thick should be thrown against the bench sides in the far left-hand corner. The planting should then be started by placing a few pips vertically in the corner and only deep enough so that the crowns are about half an inch below the top level of the sideboard. By grasping six or eight pips in one hand and holding them at the desired height a thin wall of sand can be thrown on with the other hand, thereby holding the pips in place until more are added.

There is no particular manner of placement in regard to location in the bench, except to utilize every square inch of space. If more convenient the operator can start at the extreme right-hand corner of the bench and plant toward the left. However, the edge of the planting when finished should be at right angles to the bench sides. Sand should then be sprinkled over the entire planting.

THE ROW SYSTEM

In using the row system a 1-inch wall of sand should be thrown up across the end of the bench, having the top one-half inch below the top level of the end board and the side perpendicular to the bottom of the bench. Then six or eight pips should be aligned with one hand so that the crowns are about one-half inch below the level of the top of the bench sides, and sand should be thrown up against them to hold them in position. After this row is planted a 2-inch wall of sand should be thrown up, having the top surface level with that of the preceding wall and the side perpendicular. This procedure should be followed until the planting is completed, and then sand should be sprinkled over the entire planting. Figure 7 shows pips just planted.

GROWTH REQUIREMENTS

Temperature, humidity, and ventilation are closely related, and the quality of the flower crop depends largely on the proper proportioning of these factors.

TEMPERATURE

Much discussion has taken place relative to the proper temperature at which lilies-of-the-valley should be forced. In most cases a bottom heat of 80° F. and an overhead temperature of 75° to 80° will give good results. If it is necessary to hold back a nearly mature crop on account of unexpected weather conditions, both temperatures may be approximately 25° less without affecting the quality of the blooms. In fact, if this can be done without checking other crops of lilies-of-the-valley, the flowers will have more substance, be easier to handle, and should ship better. It is doubtful, however, whether the keeping qualities would be improved.

A crop of lilies-of-the-valley should never be checked and then have heat again applied to force it. It is always best in a timed crop of this sort to wait until the desired cutting condition is attained and then retard the growth somewhat by lowering the temperature.

HUMIDITY

The maintenance of a humid atmosphere is especially necessary in summer and may be accomplished by several sprayings of the glass and thorough wetting down of the paths during the day. The weather must be considered in this connection, as less water or humidity is needed on gray or cloudy days, especially when the close system of planting is used. A thin limewash on the glass for shading is beneficial as this tends to lessen evaporation.

VENTILATION

A continuous supply of fresh air is advisable and practically essential with almost all flower crops. With lilies-of-the-valley it is especially important, since the pips are inclosed in fairly tight compartments. Ventilation may be best secured by operating the ridge sash exclusively. If a sash house is used for the forcing of lilies-of-the-valley, side ventilation may be employed provided direct air currents are deflected from the crops. No attempt is made to ventilate the bins during the first 14-day period of growth, as this is not necessary and of course would also admit light. If the house is shaded sufficiently in early summer, the bin temperature should be approximately that of the surrounding air in the house.

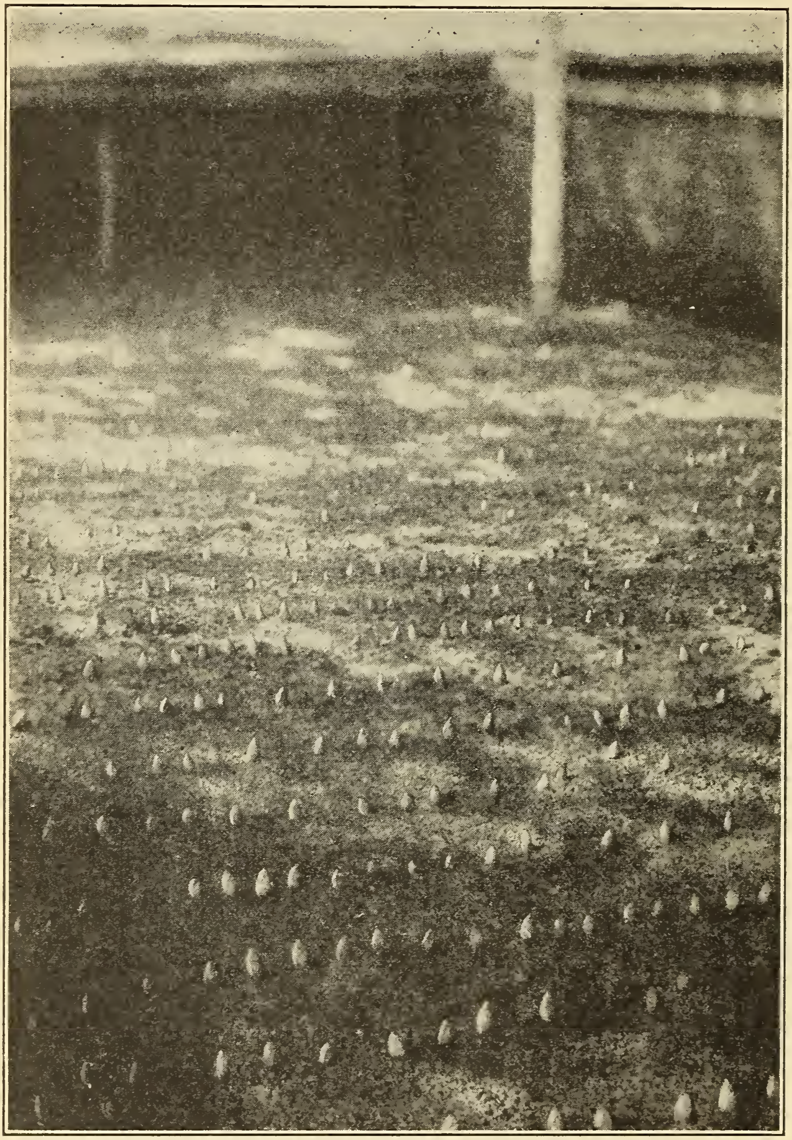

FIGURE 7.—Lily-of-the-valley pips after planting and before watering

WATERING

As soon as the pips are planted they should be "watered in" to settle the sand about the crowns and roots. After watering in, if the roots are exposed, more sand must be added.

If sand is used as the growing medium and the bench is well drained, daily watering is advisable. With strong bottom heat the sand quickly dries out. The plants also assimilate much water because of the close planting, and transpiration is rapid at the air temperature commonly employed. Overhead watering is quicker and will not hurt the flowers or foliage, provided ventilation is adequate. The flowers and foliage should not be wet on the day previous to cutting; watering, if necessary, should be accomplished by running the hose between the rows.

GREENING UP THE FOLIAGE

Absolute darkness in the bin in the early stages of forcing is preferable but not essential. If darkness is maintained from the beginning, the leaves especially will grow tall, although of a light yellow appearance. This is much more desirable than to have a shorter growth of both leaves and flowers (a condition produced where the plants are grown in only partial darkness), even though a darker green color is obtained by the usual time of admitting light, that is, after 14 days' growth.

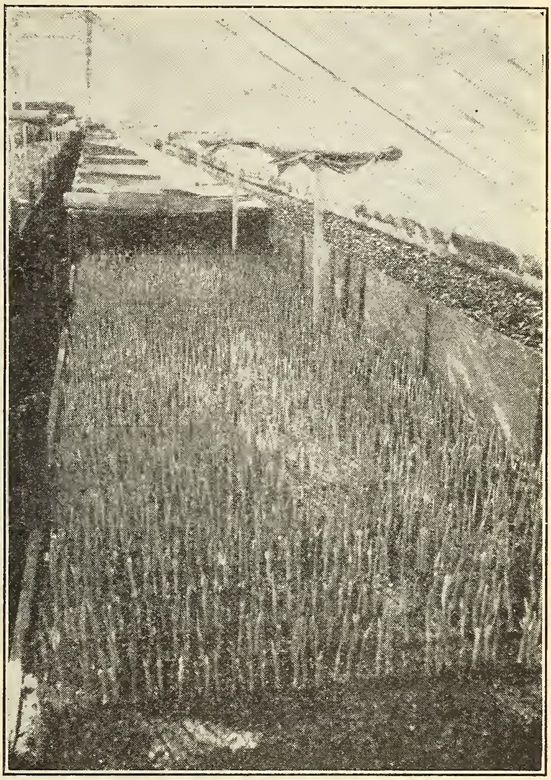
FIGURE 8.—Lily-of-the-valley pips after 10 days' growth

The temperature at which the lily-of-the-valley house is kept regulates somewhat the time of exposing the crop to strong light. In Figure 8 the pips are not far enough advanced to receive any light. As a rule, if a temperature of 80° F. is maintained, the lid on the bin should be raised at least 18 inches in front about 14 days after planting. Although a good green color is sought, foliage resembling that of the outside lily-of-the-valley can not be obtained under greenhouse conditions. It is not desirable to use out-of-door foliage even when available, since most buyers would assume that outside flowers had been used and would offer only a small price.

Direct sunlight should never fall on flowers or foliage, as the greening process is less rapid. At the end of the 14-day period lath frames may be substituted for the cloth covers, but the coloring of the leaves will be less rapid than where the top cover is merely raised on one side. Laths are of use, however, where the direct rays of the sun can not be kept off the crop in any other way.

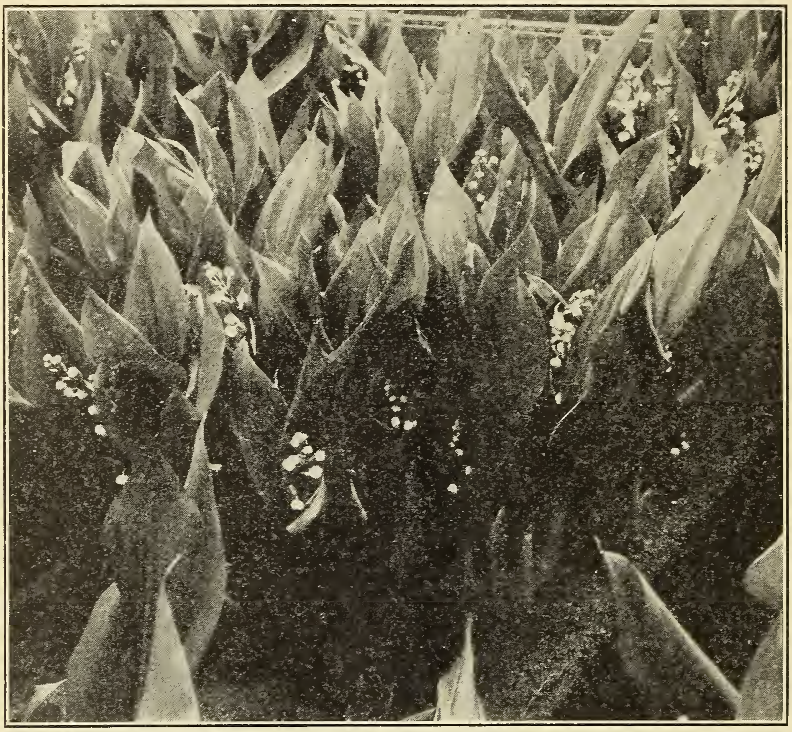

FIGURE 9.—Lilies-of-the-valley in flats almost ready to be cut

PREPARATION FOR MARKET

CUTTING

The proper cutting stage is immediately after the terminal bud has lost its deep-green color. It then has a light yellow-green appearance but is still tight, the lowest bells at this time being almost fully developed.

Two methods of cutting, dependent on the planting plan, are practiced. If close planting is used, it is best to wait until the entire crop can be cut at one time, otherwise difficulty will be experienced in cutting some of the flower stems without breaking others.

A crop planted in rows can be worked over (fig. 9), and the flowers that are ready can be cut out. For this purpose a short-bladed knife is more easily handled than scissors. The cutting of more flowers than can be bunched in a half hour should be avoided, as they wilt quickly unless the operators work in a very cool room.

Just above the crown the stem is of a very compact structure. Therefore the stem should be cut at least one-half inch above the crown, so that water may be taken up easily after the flowers are cut and bunched. By this plan the structure of the cut stem is similar throughout its entire length.

After the flowers are cut the roots are not considered suitable for forcing again and are usually discarded.

GRADING

Grading may be done by one man who is quick at the operation or by the individual buncher while arranging the flowers. The following grades are practicable: Extra selected, 12 to 15 inch stems, with 10 to 15 bells on each stem; selected, 9 to 12 inch stems with 10 to 15 bells; seconds, 7 to 9 inch stems, with 7 or more bells; shorts, 5 to 6 inches in length. The latter may be sold occasionally, but rarely bring sufficient returns to pay for the labor in grading and bunching. It is better to throw out all flowers having yellow or deformed bells or those with the bells in more or less of a cluster.

BUNCHING

Bunching lilies-of-the-valley is an art. However, under the direction of an experienced grower who knows the market standards, it should not take long for the novice to acquire the knack. Women usually make better bunchers than men.

A table sufficiently high to get the knees under comfortably should be provided for the bunchers. Unless the operator can look down on the leaves it is hard to differentiate between the light and the dark green ones.

After the flowers are graded the sheath leaves are stripped off so as to separate the flower stalk from the leafstalks and to retain the flower stem in its entirety. Sometimes this is done before grading, especially if the bunchers are qualified for both operations. Twenty-five flowers are separated out and placed in groups of five. The foliage is put in two piles, one containing long green leaves and the other short green and yellow leaves.

The operator then takes four or five long dark-green leaves in the left hand with the tops or greenest side turned away from him. A few short light-colored leaves are then added. Two groups of five flowers each are put in next, and then a few light leaves. Another group of flowers is then placed in the center of the first two. Several small leaves are put in, and these are followed by the remaining flowers. All of the flowers should be even at the top. By placing small leaves and then tall green foliage all around on the outside, the flower stems are completely hidden. The bunch, grasped upside down, is then tied rather tightly with string. There should be enough wraps to hold the leaf stalks securely in place. When the bunch is tied the stems are evened off to make all of the bunches a uniform length. A completed bunch is shown in Figure 10.

STORAGE OF CUT FLOWERS

Ten-quart buckets are very satisfactory for storing lilies-of-the-valley. For the extra selected grade they should be filled to within 3½ inches of the top with cool, fresh water. Buckets so filled should be conveniently placed so that the operators do not have to leave the table to place each bunch in water when finished. If for any reason the flowers are somewhat wilted, the bunches may be wrapped separately in one thickness of newspaper before being put in the buckets. Ordinarily, if the flowers have been handled properly before and during cutting out and while being bunched, such wrapping is not necessary. Indeed, it should be avoided if possible, for occasionally the bells will turn brown if they come in contact with the wet paper.

After being bunched, the flowers should remain in water at least 12 hours before shipping, as this gives them more substance. During this period the grower should endeavor to check all apparent development in an effort to lengthen the time the flowers may remain on sale in good condition.

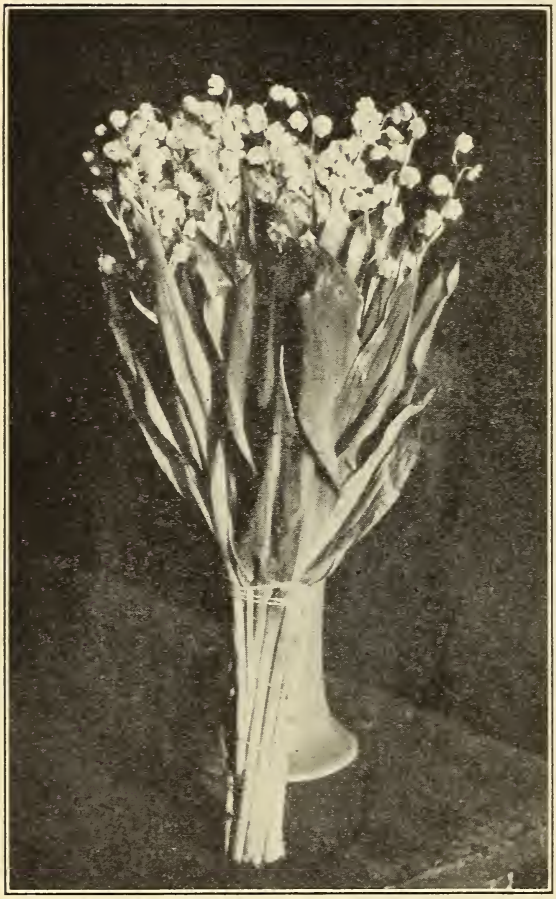

FIGURE 10.—A bunch of 25 lilies-of-the-valley

In overnight storage a temperature of 55° F. is sufficient. For longer storage, usually at the commission house, the flowers may be held satisfactorily in small containers (fig. 11) for one week at 40°; if kept for a longer period the lower bells may become watery in appearance. Nothing would be gained by holding at lower temperatures, 32° for instance, since when exposed later to a room temperature of 70° the flowers would quickly show the effect of the low temperature by rapidly breaking down.

Before packing, the bunches should be drained, shaken lightly, and all the water possible should be squeezed out of and from between the stalks, otherwise it will later drain out after packing or during shipment and soften the bottom of the box. If this occurs, damage to the flowers may result from the subsequent shifting of the bunches.

PACKING

Probably the most satisfactory box for shipping lilies-of-the-valley is made of 175-pound test corrugated paper, 24 by 14 by 8 inches in size. When bought new these boxes come knocked down, and staples for assembling them are included in the purchase price. It takes but a few minutes to make up 10 or a dozen boxes, and this number should always be kept ready for immediate use. Although boxes of this strength will carry the product to market in good condition, it is never wise to use them for more than one shipment.

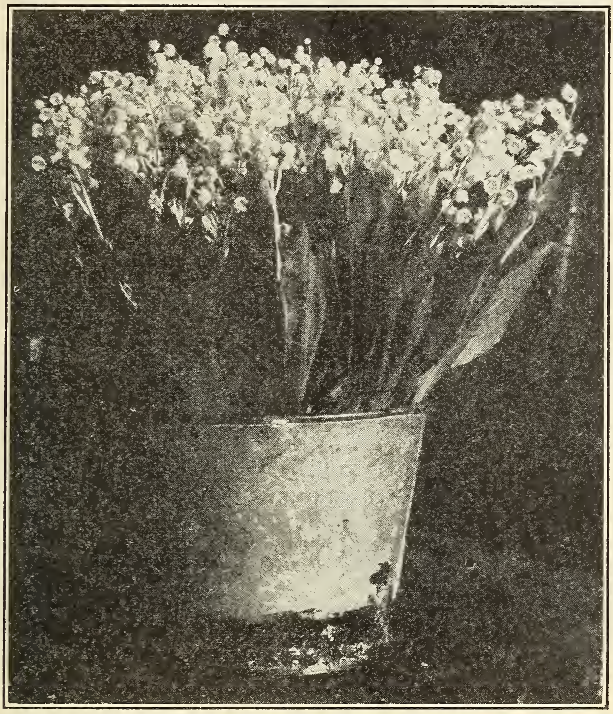

FIGURE 11.—Container holding four bunches of lilies-of-the-valley

To protect the flowers from cold in winter it is necessary to use a full lining of several thicknesses of newspaper; in the summer six to eight thicknesses of newspaper on the bottom are sufficient.

After draining off all surplus water, the bunches should be wrapped individually in waxed paper cut to a size of 12 by 18 inches. (Fig. 12.) By this method the flower bells in adjacent bunches are prevented from becoming entangled, and sufficient moisture is retained so that the flowers will stand up during shipment.

To prevent the flowers from being broken, the bunches must be securely tied in the box so they will not shift. The strings may be placed either before or after packing, but preferably before. In one layer, four bunches may be put in each end of the box of the size mentioned; or two layers may be used, making a maximum of 400 flowers to a box.

It is desirable for record purposes that the grower include in each box a statement of the date and time of shipment, names of the consignee and consignor, and the exact contents of the box. A duplicate of each statement should be filed by the grower.

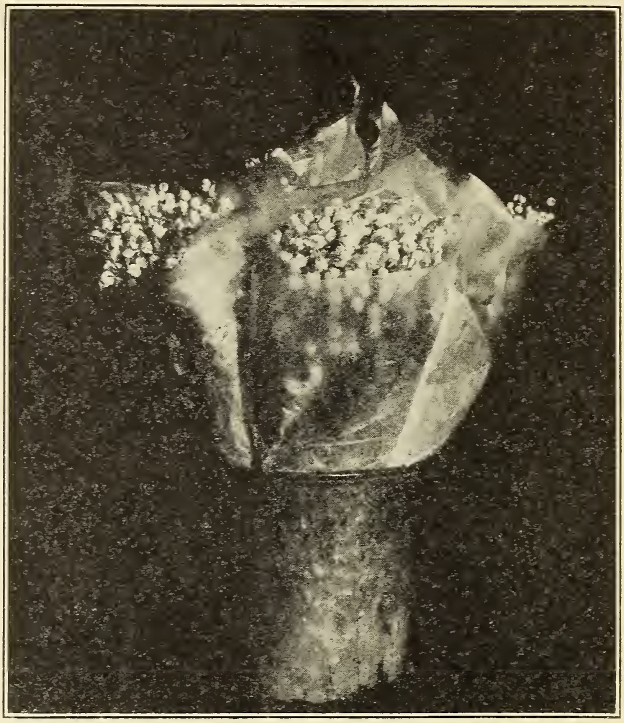

FIGURE 12.—Container of lilies-of-the-valley, showing bunches wrapped in waxed paper

SHIPPING

The package-stamp method of shipping to market may be used to good advantage if this service is available. This is a baggage-car service and necessitates the consignee's calling at the baggage room for the package. It is quick, usually efficient, and eliminates much rough handling.

The next best plan is to ship by parcel post, and for the most part this service is good. Special delivery, special handling, and insurance must be considered in an effort to dispatch the flowers as quickly as possible.

MARKETING

There is a good market for lilies-of-the-valley from September 15 until Christmas; from that time until Easter the demand is only fair. Easter is the chief holiday at which a large quantity of them is sold. It is wise to reduce the planting after Easter and during May. June is a good month, and provision should be made for a large supply. In July, August, and the first two weeks of September the market is weak and only small quantities should be grown.

From the grower's viewpoint it is usually desirable to ship small quantities regularly to several firms in different cities. Then, in case the market is poor for some reason in one city, the grower can utilize the contacts already established at other points; otherwise it might be difficult to find an immediate market to handle any large quantity satisfactorily.

It is hard to find a man or a firm doing a strictly wholesale flower business who will buy lilies-of-the-valley outright. Commission men may contract for 5,000 or 10,000 of them at Christmas and Easter at a fixed price, but during the rest of the year the grower must sell on commission.

As the commission man ships over a wide territory, he can dispose of a large quantity of lilies-of-the-valley. The retailer can not afford as a rule to keep a large supply on hand, owing to the fact that the sale is usually limited to wedding bouquets, etc., or to high-priced floral designs. It is more convenient for the average retailer to include 100 or so in his order from the commission house than to buy from a specialist.

Although the commission man fills a very important and necessary place in marketing when the grower is forcing large quantities of lilies-of-the-valley, if the grower can work up a shipping business in which regular shipments can be made to various retailers he has found perhaps the most profitable plan of marketing his crop. In this method of marketing he does not lose the customary 15 per cent that the commission house deducts for selling, and the retailer pays for the boxes and the parcel-post charges; also, the grower's responsibility customarily ends when the flowers are mailed. The extra profit in direct selling should more than offset the additional bookkeeping necessarily involved in this method.

COST OF PRODUCTION AND PROFITS

The average yield of salable flowers is about 80 per cent of the pips planted. Because the crop is more or less seasonable, in some months the grower will just about meet expenses, but during holiday periods and the usual lily-of-the-valley seasons his crop should net him a good profit. In order that the grower may know where he stands as regards profits derived from his crop, an account should be kept of all items of expense entering into its production. Local conditions determine to a certain extent the cost of growing lilies-of-the-valley, so that actual cost figures can not be given in this publication for use throughout the United States. A list of the items usually entering into the cost of production, however, is given below for use in setting up such accounts.

1. Pips; original cost, express and hauling charges.
2. Labor involved in the following operations: Handling, planting, watering, culture, bunching, and packing.
3. Coal.
4. Boxes.
5. Parcel post or other transportation charges.
6. Miscellaneous expenses, including depreciation, repairs, and interest on investment.

By keeping accounts based on these items, the cost of producing the crop may be determined with reasonable accuracy. The market price of cut lilies-of-the-valley is subject to fluctuation, depending on the quality offered and the supply and demand. The probable net profits may be estimated by deducting the cost of production, plus commission, from the average wholesale market price computed over a representative period of time.

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